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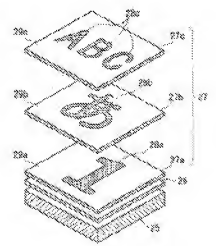
(54) DISPLAY DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a display device which is simple in composition and switches from a plurality of display forms to one display surface for a display.

SOLUTION: A first selection display layer 27a formed on a base material layer 26 is composed of a first transmission section 28a and a first mask 29a. The first transmission 28a comprises a material which can transmit any of three primary color light emitted form a light source. The first transmission section 28a is formed in a display form, for example, a shape of a numeral, and is surrounded by the first mask 29a. The first mask 29a surrounding the first transmission section 28a is composed of a light selecting-and-absorbing material having a function which absorbs incident light of specific wavelength range, for example, R light, which is emitted from the light source and is made incident, and makes another light having a wavelength range different from that of the R light pass through when another light is made incident.



DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]Drawing 1 is an appearance perspective view showing the cellular phone provided with the display of this invention.
[Drawing 2]Drawing 2 is an expansion perspective view showing the neighborhood of a manual operation button of the cellular phone shown in drawing 1.
[Drawing 3]Drawing 3 is an expanded sectional view showing the display of this invention.
[Drawing 4]Drawing 4 is an expansion perspective view showing the important section of the display of this invention.
[Drawing 5]Drawing 5 is an explanatory view showing an operation of the display of this invention.
[Drawing 6]Drawing 6 is an expansion perspective view showing a 2nd embodiment.
[Description of Notations]
13 Manual operation button
15 Display
21r, 21b, and 21g Light source
25 Light guide plate (light guide material)
27 Selection display layer
28a, 28b, and 28c Transparent part
29a, 29b, 29c mask part

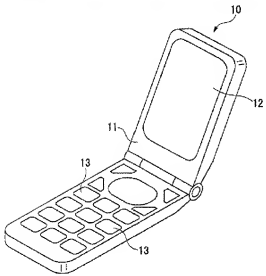
[Translation done.]

* NOTICES *

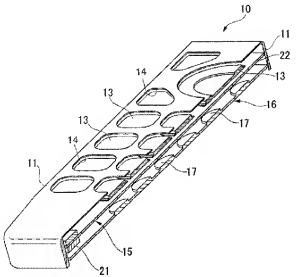
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

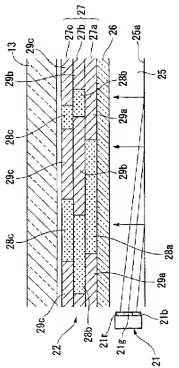
[Drawing 1]



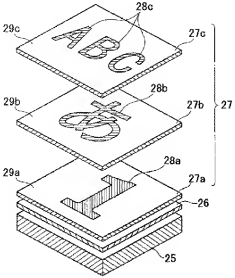
[Drawing 2]



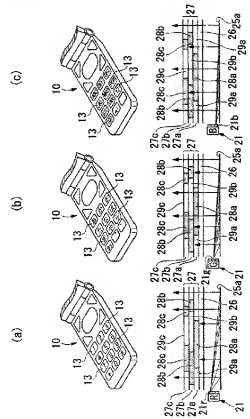
[Drawing 3]



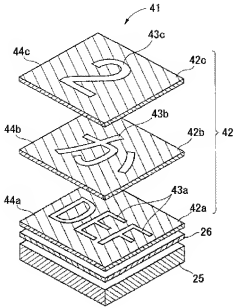
[Drawing 4]



[Drawing 5]



[Drawing 6]



[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]
This invention relates to a display.
In detail, according to the wavelength of the illumination light, a display is related with a switchable display.

[0002]
[Description of the Prior Art]
In recent years, a role of a cellular phone of a transmission and reception means of not only a voice call but an E-mail is increasing. The number of manual operation buttons is restricted by restrictions of size to such a cellular phone.
At most 20 or less pieces are standard.
For this reason, the input of two or more character types, such as a number, the alphabet, and kana, is assigned to each manual operation button, and the input of two or more character types is enabled with one manual operation button by changing an input mode.
[0003]
however, since two or more character types were assigned to one manual operation button, it will indicate all of these quota **** character type on the surface of a manual operation button, and each character becomes very small, and it is hard to see, and was easy to generate an input mistake in a cellular phone with small size of a manual operation button. Since two or more character types were assigned to one manual operation button, it had to input checking the mode of the present input sentence type of letters by a liquid crystal display, and the character input was made complicated and difficult.
[0004]

In order to make easy the character input by two or more such character types, for example in the manual operation button of a videotape recorder. By dividing the surface of one manual operation button, forming two or more display area, forming with the material which emits light with the light of specific wavelength for every display area, and changing the wavelength of the light which illuminates a manual operation button, What displays only the correspondence character type in the present input mode on a manual operation button is known (for example, patent documents 1).

[0005]

[Patent documents 1]

JP,H8-292730,A

[0006]

[Problem(s) to be Solved by the Invention]

However, in a display for videotape recorders which was mentioned above. Although there is the feature of being easy to carry out grasp of the present input mode, even if it is going to use this composition for a cellular phone, for the miniaturization of a cellular phone, Since the pause needs to form two or more display area for the surface of the manual operation button which has already made size small to the limit further, It was difficult for the display of each character type to become small very, to grasp easily an input mode and an assignment statement type of letters on the small button for [present] cellular phones, and to perform a character input comfortably.

[0007]

In light of the above-mentioned circumstances, this invention carries out the purpose of providing the display which can change two or more display shape to one display surface with simple composition, and can be displayed.

[0008]

[Means for Solving the Problem]

A mask part which modeled shape which is displayed by optical selective absorption material which absorbs light of wavelength of a specific range according to this invention in order to attain the above-mentioned purpose, A display making a selection display layer which consists of a transparent part which formed a periphery of said mask part by light transmission material which light of wavelength of said specific range penetrates at least laminate more than two-layer at least is provided.

[0009]

A transparent part which modeled shape displayed by light transmission material which light of wavelength of a specific range penetrates at least, A display making a selection display layer which consists of a mask part which formed a periphery of said transparent part by optical selective absorption material which absorbs light of wavelength of said specific range at least

laminate more than two-layer at least is provided.

[0010]

Display shape can be changed and displayed if wavelength of light which enters into a selection display layer by forming a selection display layer provided with a mask part which absorbs light of wavelength of a specific range is changed. If such a selection display layer is made to laminate, each display shape can be displayed greatly to the limit of a display rectangle, and can be made very legible.

[0011]

Said selection display layer consists of three layers, and it may be made for said mask part of each class to absorb three-primary-colors light of R, G, and B, respectively. It may have further a light source which can emit light independently, respectively for three-primary-colors light of R, G, and B. Display shape can be changed and displayed if this changes light emitted from a lighting system with the three primary colors of R, G, and B.

[0012]

Since a wavelength band which equips a lighting system with a light source of each light region of R, G, and B, and is absorbed in each selection display layer only forms a mutually different mask part in a change of such display shape, it becomes possible to form a thin and light display in low cost. The undersurface of said selection display layer may be further equipped with light guide material which spreads light from a light source towards said selection display layer.

[0013]

[Embodiment of the Invention]

Hereafter, an embodiment of the invention is described with reference to Drawings. Drawing 1 is an appearance perspective view showing the cellular phone as one embodiment provided with the display of this invention. As for the cellular phone 10, the manual operation button 13 is exposed to the surface for one side of the case 11 of a **** type to the liquid crystal display panel 12 from another side. A character, a sign, etc. which inputted the liquid crystal display panel 12 by operation of the manual operation button 13, for example are displayed.

[0014]

Drawing 2 is a fracture perspective view near the manual operation button of the cellular phone shown in drawing 1. The opening 14 which exposes two or more manual operation buttons 13 to the case 11 is formed, and they are these openings 14. -- The manual operation button 13 is exposed from each. The manual operation button 13 should just be formed, for example from a transparent rigid plastic.

[0015]

The display 15 to be explained in full detail later is formed in the undersurface of the manual operation button 13. The switch board 16 is formed in the display 15 bottom, and the switch 17

is mounted in the position corresponding to each manual operation button 13 on this switch board 16.

[0016]

An end is connected to the lighting system 21 and this lighting system 21, and the display 15 comprises the plate-like indicator 22 which spreads in the case 11. Drawing 3 is a partial expanded sectional view of a display, and drawing 4 is the expansion perspective view. The lighting system 21 of this gestalt is provided with the R light source 21r, the G light source 21g, and the illuminant B 21b which can emit light independently, respectively for the three-primary-colors light of R (red), G (green), and B (blue). Such light sources 21r, 21g, and 21b should just comprise a light emitting diode, for example.

[0017]

The indicator 22 comprises the light guide plate (light guide material) 25, the base material layer 26 provided in contact with the upper surface of this light guide plate 25, and the selection display layer 27 formed on the base material layer 26. The light guide plate 25 is formed, for example with a transparent acrylic resin, and the illumination light irradiated with the inside from the lighting system 21 spreads it. The undersurface side of the base material layer 26 and the light guide plate 25 which counters is made into the reflector 25a, and plays the role which turns to the base material layer 26 the illumination light which spreads the inside of the light guide plate 25, and is reflected. Such a reflector 25a is realized by, for example, forming the projected rim of detailed a large number, and unevenness of detailed a large number in the undersurface of the light guide plate 25.

[0018]

The base material layer 26 should just comprise transparent resin which makes each three-primary-colors light irradiated from the light sources 21r, 21g, and 21b penetrate, for example, PET, (polyethylene terephthalate), and supports the selection display layer 27 on the upper surface. The selection display layer 27 comprises three layers, the 1st selection display layer 27a, the 2nd selection display layer 27b, and the 3rd selection display layer 27c.

[0019]

The 1st selection display layer 27a formed on the base material layer 26 comprises the 1st transparent part 28a and the 1st mask part 29a. The 1st transparent part 28a should just comprise material which makes each three-primary-colors light irradiated from the light sources 21r, 21g, and 21b penetrate. This 1st transparent part 28a is formed in display shape, for example, the shape which modeled one character of a number, and the 1st mask part 29a surrounds the circumference (refer to drawing 4). The 1st mask part 29a that encloses the 1st transparent part 28a will be absorbed if the light of the wavelength of a specific range, for example, R light irradiated from the light source 21r, enters, and if the light of other wavelength other than R light enters, it comprises optical selective absorption material which has the

operation which makes it penetrate as it is.

[0020]

The 2nd selection display layer 27b laminated on the 1st selection display layer 27a comprises the 2nd transparent part 28b and the 2nd mask part 29b. The 2nd transparent part 28b should just comprise material which makes each three-primary-colors light irradiated from the light sources 21r, 21g, and 21b penetrate. This 2nd transparent part 28b is formed in display shape, for example, the shape which modeled one character of kana, and the 2nd mask part 29b surrounds the circumference (refer to drawing 4). The 2nd mask part 29b will absorb this, if the light of the wavelength of a specific range, for example, G light irradiated from the light source 21g, enters, and if the light of other wavelength other than G light enters, it comprises optical selective absorption material which has the operation which makes it penetrate as it is.

[0021]

The 3rd selection display layer 27c laminated on the 2nd selection display layer 27b comprises the 3rd transparent part 28c and the 3rd mask part 29c. The 3rd transparent part 28c should just comprise material which makes each three-primary-colors light irradiated from the light sources 21r, 21g, and 21b penetrate. This 3rd transparent part 28c is formed in display shape, for example, the shape which modeled the alphabet, and the 3rd mask part 29c surrounds the circumference (refer to drawing 4). The 3rd mask part 29c will absorb this, if the light of the wavelength of a specific range, for example, B light irradiated from the light source 21b, enters, and if the light of other wavelength other than B light enters, it comprises optical selective absorption material which has the operation which makes it penetrate as it is.

[0022]

On such an indicator 22, the manual operation button 13 mentioned above is formed. The transparent parts 28a-28c are formed in the portion in which such a manual operation button 13 is formed, and display the input mode of the manual operation button 13.

[0023]

An operation of the display 15 of this invention in the cellular phone 10 of the above composition is explained with reference to drawing 5. The cellular phone 10 makes the light source 21r, as for the lighting system 21 which constitutes the display 15, turn on, as shown in drawing 5 a, when the input mode of the manual operation buttons 13, such as the time of standby and a telephone call, is a number. The inside of the light guide plate 25 is spread, it reflects in the selection display layer 27 direction in the reflector 25a, and R light (red light) emitted from the light source 21r is emitted from the whole upper surface of the light guide plate 25.

[0024]

Although R light which entered into the 1st transparent part 28a in the 1st selection display layer 27a among R lights which entered into the selection display layer 27 through the base

material layer 26 penetrates the 1st selection display layer 27a as it is, R light which entered into the 1st mask part 29a cannot penetrate the 1st selection display layer 27a by R optical absorption operation of the 1st mask part 29a.

[0025]

Thereby, R light emitted from the upper surface of the 1st selection display layer 27a turns into only light which penetrated the 1st transparent part 28a. Since the 1st transparent part 28a is formed in the shape which modeled one character of a number as it mentioned above, R light which modeled the number is emitted from the upper surface of the 1st selection display layer 27a.

[0026]

Then, although R light which modeled this number enters into the 2nd selection display layer 27b, The 2nd transparent part 28b that constitutes the 2nd selection display layer 27b penetrates the light of all the wavelength bands, and the 2nd mask part 29b absorbs only G light (green light), and since the light of other wavelength bands is made to penetrate, R light which modeled the number penetrates the 2nd selection display layer 27b as it is. Similarly, also in the 3rd selection display layer 27c, the 3rd transparent part 28c penetrates the light of all the wavelength bands, the 3rd mask part 29c absorbs only B light (blue glow), and since the light of other wavelength bands is made to penetrate, R light which modeled the number also penetrates the 3rd selection display layer 27c as it is.

[0027]

Thus, if R light is made to emit from the lighting system 21, from the surface of the selection display layer 27, the shape of the 1st transparent part 28a, i.e., the red display light which modeled the number, will be emitted. The number which shows that the present input mode is a number input is vividly displayed on the manual operation button 13 of the cellular phone 10.

[0028]

As shown in drawing 5 b, when the input mode of the manual operation buttons 13, such as the time of the creation input of the E-mail in the cellular phone 10, is kana, the light source 21g is made, as for the lighting system 21 which constitutes the display 15, to turn on. G light (green light) emitted from the light source 21g spreads the inside of the light guide plate 25, and it reflects in the selection display layer 27 direction, and it is emitted uniform from the whole upper surface of the light guide plate 25 in the reflector 25a.

[0029]

Although G light which entered into the selection display layer 27 through the base material layer 26 enters into the 1st selection display layer 27a first, Since the 1st transparent part 28a that constitutes the 1st selection display layer 27a penetrates the light of all the wavelength bands, and the 1st mask part 29a absorbs only R light (red light) and the light of other wavelength bands is made to penetrate, G light penetrates the 1st selection display layer 27a

as it is on the whole surface.

[0030]

Although G light which penetrated the 1st selection display layer 27a as it was enters into the 2nd selection display layer 27b, G light which entered into the 2nd mask part 29b cannot penetrate the 2nd selection display layer 27b by G optical absorption operation of the 2nd mask part 29b.

[0031]

Thereby, G light emitted from the upper surface of the 2nd selection display layer 27b turns into only light which penetrated the 2nd transparent part 28b. Since the 2nd transparent part 28b is formed in the shape which modeled the kana character as it mentioned above, G light which modeled the kana character is emitted from the upper surface of the 2nd selection display layer 27b.

[0032]

Then, although G light which modeled this kana enters into the 3rd selection display layer 27c, Since the 3rd transparent part 28c that constitutes the 3rd selection display layer 27c penetrates the light of all the wavelength bands, and the 3rd mask part 29c absorbs only B light (blue glow) and the light of other wavelength bands is made to penetrate, G light which modeled kana penetrates the 3rd selection display layer 27c as it is.

[0033]

Thus, if G light is made to emit from the lighting system 21, from the surface of the selection display layer 27, the green display light which modeled the shape of the 2nd transparent part 28b, i.e., kana, will be emitted. The present input mode is a kana input and the green kana character assigned to each manual operation button 13 is vividly displayed on each manual operation button 13 of the cellular phone 10.

[0034]

As shown in drawing 5 c, when the input mode of the manual operation button 13 is the alphabet, the light source 21b is made, as for the lighting system 21 which constitutes the display 15, to turn on. B light (blue glow) emitted from the light source 21b spreads the inside of the light guide plate 25, and it reflects in the selection display layer 27 direction, and it is emitted uniform from the whole upper surface of the light guide plate 25 in the reflector 25a.

[0035]

Although B light which entered into the selection display layer 27 through the base material layer 26 enters into the 1st selection display layer 27a first, Since the 1st transparent part 28a that constitutes the 1st selection display layer 27a penetrates the light of all the wavelength bands, and the 1st mask part 29a absorbs only R light (red light) and the light of other wavelength bands is made to penetrate, B light penetrates the 1st selection display layer 27a as it is on the whole surface.

[0036]
Since similarly the 2nd transparent part 28b that constitutes the 2nd selection display layer 27b penetrates the light of all the wavelength bands, and the 2nd mask part 29b absorbs only G light (green light) and the light of other wavelength bands is made to penetrate, B light penetrates the 2nd selection display layer 27b as it is on the whole surface.
[0037]
Although B light which penetrated the 1st selection display layer 27a and the 2nd selection display layer 27b on the whole surface enters into the 3rd selection display layer 27c, B light which entered into the 3rd mask part 29c cannot penetrate the 3rd selection display layer 27c by B optical absorption operation of the 3rd mask part 29c.
[0038]
Thereby, B light emitted from the upper surface of the 3rd selection display layer 27c turns into only light which penetrated the 3rd transparent part 28c. Since the 3rd transparent part 28c is formed in the shape which modeled the alphabet as it mentioned above, B light which modeled the character of the alphabet is emitted from the upper surface of the 3rd selection display layer 27c.
[0039]
Thus, if B light is made to emit from the lighting system 21, from the surface of the selection display layer 27, the blue display light which modeled the shape of the 3rd transparent part 28c, i.e., the character of the alphabet, will be emitted. The present input mode is an alphabet input and the blue alphabet assigned to each manual operation button 13 is vividly displayed on each manual operation button 13 of the cellular phone 10.
[0040]
As mentioned above, if the wavelength of the light emitted from the lighting system 21 by forming the selection display layers 27a-27c provided with the mask part from which the wavelength band to absorb differs mutually is changed, the display shape (a number, kana, alphabet) which the transparent part of each class modeled can be changed and displayed. Since the transparent part which modeled such display shape is laminated so that it may lap mutually, as shown in drawing 4 or drawing 5, it can display each display shape greatly to the limit of the range of the manual operation button 13, and can make it very legible.
[0041]
Since the wavelength band which equips the lighting system 21 with the light source of each light region of R, G, and B, and is absorbed in each selection display layer 27a-27c only forms the mutually different mask parts 29a-29c in the change of such display shape, It becomes possible to form a thin and light display in low cost.
[0042]
In the embodiment mentioned above, although the shape displayed by a transparent part was

constituted and the circumference of this transparent part is enclosed by the mask part, the shape displayed by a mask part may be constituted. Drawing 6 is an expansion perspective view showing a 2nd embodiment of this invention. In this display 41, the 1st mask part 43a, the 2nd mask part 43b, and the 3rd mask part 43c are formed in the 1st selection display layer 42a, the 2nd selection display layer 42b, and the 3rd selection display layer 42c which constitute the selection display layer 42, respectively.

[0043]

The 1st mask part 43a, the 2nd mask part 43b, and the 3rd mask part 43c model the alphabet, kana, and number which are display shape, respectively, and are formed. The 1st mask part 43a, the 2nd mask part 43b, and the 3rd mask part 43c will be absorbed, respectively, if R light, G light, and B light enter, and they comprise optical selective absorption material which makes the light of the other wavelength penetrate as it is.

[0044]

The 1st mask part 43a, the 2nd mask part 43b, and the 3rd mask part 43c are surrounded in the circumference by the 1st transparent part 44a, the 2nd transparent part 44b, and the 3rd transparent part 44c, respectively. Such transparent parts 44a-44c make light penetrate in a full wave length region.

[0045]

In the 1st transparent part 44a that R light is absorbed by the 1st mask part 43a that modeled the alphabet which is display shape by such composition when R light entered into the selection display layer 42, for example, stops penetrating in the upper layer, and encloses the periphery of this 1st mask part 43a, R light is penetrated as it is. This turns on only the peripheral part surrounding the alphabet in red, display shape comes floating darkly, and is observed, and the input character assigned to a present input mode and manual operation button can be displayed vividly.

[0046]

In drawing 4 and drawing 5, display a number with a kana character and G light, and make it display the alphabet with B light by R light, respectively, or. The combination of each mask part, such as displaying a number with the alphabet and G light and making it make a kana character express as B light with R light, respectively etc., and display shape is not limited.

[0047]

Although the embodiment mentioned above showed the example which applied the display of this invention to the manual operation button of the cellular phone, It is completely applicable to the display etc. of the function accompanying the mode change of the change of a display of the key in the kana input mode and alphanumeric character input mode of a keyboard of a personal computer, and the manual operation button of various electric appliances for example, instead of what is limited to this, of course in a similar manner.

[0048]

[Effect of the Invention]

As mentioned above, display shape can be changed and displayed, if the wavelength of the light which enters into a selection display layer by forming the selection display layer provided with the mask part which absorbs the light of the wavelength of a specific range according to the display of this invention is changed as explained in detail. If such a selection display layer is made to laminate, each display shape can be displayed greatly to the limit of a display rectangle, and can be made very legible.

[0049]

Said selection display layer consists of three layers, and it may be made for said mask part of each class to absorb the three-primary-colors light of R, G, and B, respectively. It may have further the light source which can emit light independently, respectively for the three-primary-colors light of R, G, and B. Display shape can be changed and displayed if this changes the light emitted from a lighting system with the three primary colors of R, G, and B.

[0050]

Since the wavelength band which equips a lighting system with the light source of each light region of R, G, and B, and is absorbed in each selection display layer only forms a mutually different mask part in the change of such display shape, it becomes possible to form a thin and light display in low cost. The undersurface of said selection display layer may be further equipped with the light guide material which spreads the light from a light source towards said selection display layer.

[Brief Description of the Drawings]

[Drawing 1]Drawing 1 is an appearance perspective view showing the cellular phone provided with the display of this invention.

[Drawing 2]Drawing 2 is an expansion perspective view showing the neighborhood of a manual operation button of the cellular phone shown in drawing 1.

[Drawing 3]Drawing 3 is an expanded sectional view showing the display of this invention.

[Drawing 4]Drawing 4 is an expansion perspective view showing the important section of the display of this invention.

[Drawing 5]Drawing 5 is an explanatory view showing an operation of the display of this invention.

[Drawing 6]Drawing 6 is an expansion perspective view showing a 2nd embodiment.

[Description of Notations]

13 Manual operation button

15 Display

21r, 21b, and 21g Light source

25 Light guide plate (light guide material)

27 Selection display layer
28a, 28b, and 28c Transparent part
29a, 29b, 29c mask part

[Translation done.]

CLAIMS

[Claim(s)]
[Claim 1]
A display making a selection display layer characterized by comprising the following laminate more than two-layer at least.
A mask part which modeled shape displayed by optical selective absorption material which absorbs light of wavelength of a specific range.
A transparent part which formed a periphery of said mask part by light transmission material which light of wavelength of said specific range penetrates at least.

[Claim 2]
A display making a selection display layer characterized by comprising the following laminate more than two-layer at least.
A transparent part which modeled shape displayed by light transmission material which light of wavelength of a specific range penetrates at least.
A mask part which formed a periphery of said transparent part by optical selective absorption material which absorbs light of wavelength of said specific range at least.

[Claim 3]
The display according to claim 1 or 2, wherein said selection display layer consists of three layers and said mask part of each class absorbs three-primary-colors light of R, G, and B, respectively.
[Claim 4]
A display given in any 1 paragraph of Claims 1-3 having further a light source which can emit light independently, respectively for three-primary-colors light of R, G, and B.
[Claim 5]

A display given in any 1 paragraph of Claims 1-4 equipping the undersurface of said selection display layer with light guide material which spreads light from a light source towards said selection display layer further.

[Translation done.]